REMARKS/ARGUMENTS

Claim 1-20 are pending in the application. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bahel et al (U.S. 5,303,561) in view of Dudley et al (U.S. 5,081,846).

In response, the applicants have reviewed those cited references in detail and believe the present claims are patentably distinctive thereover for the reasons to be discussed hereinbelow.

The present invention relates to the reduction of indoor air flow for purposes of comfort as the outdoor temperature decreases, since the capacity of the heat pump is decreased at these lower temperatures. Lower indoor air flow results in reduced velocity and increased temperatures of the supply air, both of which tend to prevent a cold-blow condition and provide greater occupant comfort. Thus, as shown in Fig. 2 of the applicant's specification, curve 50 illustrates the supply air flow that is required to maintain the supply air temperature at a constant 105° F (as represented by the linear curve 52) as the outdoor temperature varies between 12°F and 42°F.

However, the applicants also recognized that this reduction in indoor air flow must be controlled at the lower outdoor temperatures in order to avoid operating the compressor in the high pressure ratio region. This is particularly true when using the higher pressure refrigerant as R410A. That is, as shown by the curve 65-67 in Fig. 3 of the applicant's specification, if one simply employs the relatively low constant air flow to gain higher supply air temperatures without concern with the associated high pressure ratios that may occur, the resulting pressures may exceed those limits for compressor reliability and safe operation of interconnecting tubing. With this in mind, the applicants operate on curve 60 of Fig. 3 wherein the indoor airflow is maintained at a constant supply air temperature of a little over 100° while at the same time the compressor discharge pressure of the heat pump system will also remain relatively constant as is depicted by the linear curves 61. By design, the discharge pressure is set so the maximum allowable vapor pressure as shown in linear curve 63 will not be exceeded.

In contrast to the above, neither of the cited references are concerned with either the cold blow problem or that of maintaining the operating pressures of the system within allowable limits.

The Bahel reference attempts to save energy used by reducing the airflow supplied and consequently the power consumed, without substantially sacrificing capacity. This is

done simply to "achieve optimum heating and cooling efficiencies". Bahel addresses occupant comfort by controlling the indoor environment to the ASHRAE defined temperature and humidity envelope, which is primarily a cooling/dehumidifying function. The heating fan control is not intended as part of the comfort solution but rather that of energy savings.

In this regard, the Examiner has said that "Bahel discloses a heat pump system in which the indoor fan speed is adjusted in response to outdoor air temperature (see Figure 3) such that the fan speed increases as the outdoor temperature increases". While it is true that reducing the airflow at lower outdoor temperatures will increase the supply air temperature and reduce cold blow, the relationship as shown in Fig. 3 will clearly not result in maintaining the temperature of the supply air moving over the indoor coil at a constant level as recited in applicant's claims 1 and 13. Neither will it result in maintaining the compressor discharge pressure within reliable limits as recited in the applicant's claims 9 and 17.

The Dudley reference does not address comfort issues of heat pumps but rather teaches a scheme of blower control that maximizes the system efficiency of a heat pump that provides water heating simultaneously with space heating. The problem addressed is one of supplying enough heat to the space to meet the demands of the space while using excess heating capacity to efficiently heat water when the space heating demand is low. It does not address "cold blow" but simply delivers the heat pump heating to the space during high load conditions (low outdoor temperature) and uses electric heaters to heat the water at that time. The efficiency improvement sought is gained during low space load by using heat pump heat to heat the water and thereby reduce the use of the less efficient electric heat. The indoor fan speed is modified on the basis of the space heating load. Again the objective is efficiency and the control results in fan speed control that is counter to the objectives of the present application. As stated in column 2, lines 18-24, "Moreover, the distribution of the heat simultaneously for space heating and water heating depends on the indoor fan operation, which is a function of the space heating, i.e. the higher the space heating load the higher the indoor fan speed. Thus, the higher the indoor fan speed, the more heat is supplied to the space and less to the water". In this regard, supplying more heat to the space does not imply that the air supplied would be warmer. The total heat supplied to the space would be greater but the velocity of the delivery would be increased for efficiency. Thus, rather than decreasing the indoor airflow at lower outdoor temperatures as in the applicants invention, Dudley increases the indoor airflow at lower outdoor temperatures, which is counter to the

applicants invention and would clearly not result in maintaining the temperature of the supply air moving over the indoor coil at a constant level as recited in the applicants recited claims 1 and 13. Neither would it result in maintaining the compressor discharge pressure within reliable operating limits as recited in the applicant's claims 9 and 17. Even assuming, arguendo, that the features of the two cited references were combined as suggested by the Examiner, they would not result in the applicant's invention because of the reasons discussed hereinabove. Rather, they would tend to teach away from the applicant's invention since they both relate to efficiency and in no way show or suggest the features relating to avoiding cold blow or undesirable pressures in the system as taught and claimed by the applicants.

For the reasons discussed hereinabove, the applicants believe that claims are patentably distinctive over the cited references. A reconsideration of the Examiner's rejections and a passing of the case to issue is therefore respectfully requested.

If the Examiner wishes to expedite disposition of the above-captioned patent application, he is invited to contact Applicant's representative at the telephone number below.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or credit any overpayment to Deposit Account No. 50-0289.

Respectfully submitted,

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